(51) Int. Cl	G06F 3/12 B41J 29/38 G06F 9/46	

(71) Applicant: XEROX CORP

(72) Inventor: DAVID L SALGADO
JOHN W DAWTON
NORMAN D ROBINSON JR
STEVEN F SCRAINAR
SMITH CYNTHIA A
HOLY S BECK
GUSMANO DONALD J
JEFFREY D DEEBUS
KENNETH J BACK
GARY W KASSMANN

(54) **MULTIFUNCTIONAL PRINTING SYSTEM**

(57) Abstract:

PROBLEM TO BE SOLVED: To enable flexible queue control needed for the multifunctional printing system by setting the level relation of job priority in a list, obtaining information on the priority of an input job from the job and inserting it into a queue, and taking the job having top priority set in the list out of respective jobs and processing it at the time of job processing.

SOLUTION: The multifunctional printing system has a memory including a queue storing a 1st job A which is generated by 1st service and has 1st priority 30 corresponding to the 1st service and a 1st job B which is generated by 2nd service and has 1st priority 10 corresponding to the 1st service in specific order. The level relation of job priority is set in the list and information on the input job is obtained from the job and inserted into the queue. When a job in the queue is processed, the job having the top priority set in the list is taken out of the respective jobs and processed.

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The multirole printing system which has the memory containing the queue which memorizes the 2nd job which is generated by the 1st service characterized by providing the following, is generated by the 1st job which has the 1st priority according to the 1st service, and the 2nd service, and has the 2nd priority according to the 2nd service according to predetermined sequence. The list with which the order relation of a job priority was set up so that it might be stored in the aforementioned memory and the 2nd priority of the above might become dominance from the 1st priority of the above as the one mode. Perform the exchange of the aforementioned memory and information, read a part of 1st job of the above, and the priority is searched for. The 1st job of the above is inserted in the 1st position in the aforementioned queue according to the priority of the 1st job searched for. The controller which reads a part of 2nd job of the above after this, determines the priority, and inserts the 2nd job of the above in the 2nd position in the aforementioned queue according to the priority of the 1st job of the above searched for, and the 2nd job, The print engine which prints the 2nd job of the above ahead of the 1st job of the above based on the order relation of the job priority set as the aforementioned list.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] generally this invention is processed about the multirole printing system which has one or more queues according to a set of the processing which attaches priority to these jobs especially based on the generator of these jobs for management of the insertion processing to 1, 1 of two or more jobs, or two or more queues, and the rule by which the job was programmed -- ** -- it is related with the competition management scheme in consideration of both
[0002]
[Description of the Prior Art] The concept of a print queue is important in operation of various digital duplicate systems. For example, it is indicated that an interruption job can be wedged into the job under present printing processing by suitable queue management for U.S. JP,5,206,735,B [else / GAURONSUKI / (Gauronski et al.)] (it is hereafter called 735 patents) of April 27, 1993 issue.
[0003] If especially these 735 patents are referred to, a certain specific job will be acquired from a bulk memory, and will be inserted in the "logic point" related to the job under present processing in a queue as a "job file." If printing processing reaches the logic point with which the specific job was inserted, the job under processing will be then interrupted and the specific job will be processed. Completion of processing of the specific job resumes the interrupted processing of a job.
[0004] In the usual case, the queue indicated by 735 patents is managed by the FIFO ("FIFO") method except for the case where a specific job (namely, interruption) is inserted in a queue. In the example illustrated by 735 patents, an interruption job is inserted in an above-mentioned queue except for the case where an interruption job is printing processing actually. When the 1st interruption job is printing processing, the 2nd interruption job becomes the turn after the interruption job under processing. Priority is essentially actually granted to the interruption job under processing. The matter about wedging the 2nd interruption job into the 1st interruption job is written to U.S. JP,5,535,009,B of July 9, 1996 issue by Hansen (Hansen).
[0005] The queue management method of 735 patents is not the the best for using by the multirole printing system. The method is because the job type for queue management is not discriminated. Therefore, in many examples which often exist, priority cannot be given to a print job over a copy job, and the reverse cannot be performed, either. The system suitable for especially use by the multirole printing system is indicated by U.S. JP,4,947,345,B [else / paradise / (Paradise et al.)] (it is called 345 patents) of August 7, 1990 issue, and Japanese Patent Application No. (August 22, 1983 public presentation) 152821 / 58 to /.

[0006] In addition, by combining a digital scanner and a digital printer, a multirole printing system is a system made it have a system and functions, such as a printer, a copy machine, and facsimile apparatus, and is also called a digital compound machine and multifunction opportunity.

[0007] In 345 patents, it is used for storing of the 1st queue of a copy job and a print job, and it is used in parallel with the 1st queue for storing of a facsimile (FAX : fax) job, the 2nd queue communicating with the 1st queue. If a number of fax jobs defined beforehand are stored in the 2nd queue, the they-stored job will be put in at the head of the job group of the 1st queue, and these fax job will be printed in front of the copy job then stored in the queue, and a print job.

[0008] It had to be restricted although the queue management scheme of 345 patents was performing job discernment. For example, a fax queue can receive preferential treatment to a copy/print queue, and, as a result, a fax job can be printed in front of a copy job or a print job. However, the structure for treating a copy job and a print job preferentially is not shown. Although U.S. JP,5,511,150,B [else / BYUDETO / (Beaudet et al.)] of April 23, 1996 issue is performing preferential treatment of the copy job over a print job, it is not a thing in the case of using the queue about which it argues with each above-mentioned advanced technology. Moreover, by the technique of 345 patents, when preferential treatment is given rather than a copy/print job to many FAX jobs, what "being stuck (it fixing)" into a copy/print queue can do a copy job or a print job.

[0009]

[Problem(s) to be Solved by the Invention] In essence, it succeeds in 345 patents for the limited purpose, and they do not show the technique of flexible queue management which needs capacity and directions for the multirole printing system which are increasing in number at an increasing tempo. The multirole printing system in which the wide range queue management in which the use gestalt of various kinds which each needs and these users of various users demand is reconciled, and it deals is possible is called for. Moreover, the queue managerial system which promises a throughput suitable about the job of all the kinds with which the multirole printing system will meet is demanded.

[0010]

[Means for Solving the Problem] The 1st job which the multirole printing system concerning this invention is generated by the 1st service, and has the 1st priority according to the 1st service, The 2nd job which is generated by the 2nd service and has the 2nd priority according to the 2nd service, It is the multirole printing system which has the memory containing the queue memorized according to the sequence of ******. The list with which the order relation of a job priority was set up so that it might be stored in the aforementioned memory and the 2nd priority of the above might become dominance from the 1st priority of the above as the one mode, Perform the exchange of the aforementioned memory and information, read a part of 1st job of the above, and the priority is searched for. The 1st job of the above is inserted in the 1st position in the aforementioned queue according to the priority of the 1st job searched for. The controller which reads a part of 2nd job of the above after this, determines the priority, and inserts the 2nd job of the above in the 2nd position in the aforementioned queue according to the priority of the 1st job of the above, Based on the order relation of the job priority set as the aforementioned list, it has the print engine which prints the 2nd job of the above ahead of the 1st job of the above.

[0011] That is, in this invention, after setting the ranking relation of a job priority as the list and acquiring the information on the priority of a job to the inputted job concerned, it inserts in a queue. In case the job held in the queue is processed, the job which has the dominance priority in the ranking relation set as the list among each job is taken out and processed.

[0012]

[Embodiments of the Invention] Hereafter, the gestalt (henceforth an operation gestalt) of operation of this invention is explained based on a drawing.

[0013] The digital copy system of the type suitable for the suitable operation gestalt of this invention is shown in drawing 1 . A digital copy system is equipped with the document feeder 1 and a control panel 2 like illustration. A control panel 2 is equipped with a display function. After the document feeder 1 will transport the set document to the predetermined reading position on the picture reader 3 if a user inputs an operating condition on a control

panel 2, and reading of the document finishes, the document is read and it carries away from a position. The picture reader 3 irradiates light at the document carried to a reading position. The reflected light from the document at this time is changed into an electric signal, i.e., a picture signal, by solid-state image pickup devices, such as CCD (charge-coupled device) image sensors. Image formation equipment 4 forms the picture which the picture signal expresses on a regular paper or a thermal paper by the conventional methods, such as an electrophotography method, a sensible-heat formula, a hot printing formula, and an ink-jet method.

[0014] If a form is supplied to image formation equipment 4 from either of two or more form cassettes 7, image formation equipment 4 will perform image formation (namely, printing) on one side of the form. The double-sided copy unit 5 turns over the form with which one side was printed, and supplies it to image formation equipment 4 anew. Consequently, a picture is formed also in another field of a form and a double-sided copy (double-sided printing) is completed. The double-sided copy unit 5 is designed so that two or more forms which were designed more nearly customarily than before so that re-supply of a form might be performed immediately, or were accumulated may be re-supplied in order on a lower shell. The form by which the double-sided copy was carried out is discharged from image formation equipment 4, and is sorted and outputted to an output unit (sorter) 6 according to the turn of a page.

[0015] Two or more applications 8 (generally it prepares for a digital copy system) share the document feeder 1 which is the resources built into the digital copy system, a control panel 2, the picture reader 3, image formation equipment 4, the double-sided copy unit 5, an output unit 6, and the form cassette 7. Various things, such as copy machine application, printer (IOT:Image Output Terminal:picture output terminal) application, and facsimile (FAX) application, are contained in application. Moreover, the digital copy system is connected to the network by the well-known network connection means 9.

[0016] The multirole printing system 10 for networks is shown in drawing 2. The printing system 10 contains the printer 12 functionally connected to the network services module 14. A printer 12 contains the video control module (VCM) 16 as an electronic subsystem. VCM16 performs the exchange of a scanner 18 and a printer 20, and information. For example, VCM16 adjusts operation of a scanner and a printer in a digital copy. In addition, the detail of VCM16 is explained anew later. In a digital copy, a scanner 18 (referred to also as IIT (Image Input Terminal:picture input terminal)) reads the picture of the original document for example, using a CCD full WIDOSU (full) width) array (array of the maximum paper size and this width of face), and changes into a digital signal the analog video signal acquired as a result. Then, the image-processing section 22 (refer to drawing 3) connected to the scanner 18 performs signal amendment etc., changes the amended signal into multi-stage story signals, such as a binary signal, compresses the multi-stage story signal, and stores the multi-stage story signal in the electronic PUREKORESHON (it abbreviates to electronic precollation:EPC) memory 24.

[0017] When it returns to drawing 2, a printer 20 (called IOT:Image Output Terminal) has suitably the print engine which used the xerography. This print engine has the belt of the multi-pitch which is not illustrated, for example. A multi-pitch belt is written with the image formation sources (source), such as the synchronous system source (for example, laser raster output scanning device) and the asynchronous system source (for example, Light Emitting Diode print bar). In printing processing, the image data of a multi-stage story is read from the EPC memory 24 (drawing 3), and the image formation source is turned on and off according to this image data. Consequently, a latent image is formed on a photo conductor. Next, the latent image is developed for example, by the hybrid jumping developing-negatives method (hybrid jumping development technique) etc., and is imprinted by the print media sheet. If melting fixing of the imprint result is carried out and a printing result is generated, the printing result will be over turned for double-sided printing, or will only be outputted as it is. It could understand easily for it to be able to change into form other than a xerography print engine, without changing the concept which has the usual knowledge in the technical field to which this invention belongs and on which this operation gestalt is based in a printer, if it becomes a person (it is called this contractor). For example, the printing system 10 can also be constituted using a

thermal ink jet printer or an IONO graphic (ionografic) printer.

[0018] Especially with reference to drawing 3, VCM16 is explained in more detail. VCM16 has the video bus (it is called "V bus") 28, and various I / O units, a data transfer mechanism, storage, etc. exchange a signal by this V bus 28. For example, suitably, in the V bus 28, it is high speed and the extensible bus of a 32-bit data burst transfer method can be used for 64 bits. According to the 32 bit patterns, the maximum bandwidth of about 60-megabyte per second is realizable. For example, bandwidth of V bus can also be carried out by 100-megabyte per second.

[0019] The storage of VCM16 contains the EPC memory section 30 and the bulk memory section 32. The EPC memory 24 is connected to the V bus 28 for the EPC memory section 30 through the DRAM controller 33 including the EPC memory 24. The EPC memory 28 is DRAM and suitably extensible to 64 M bytes using two 32 bit SIMM modules of high density. The bulk memory section 32 contains the SCSI hard drive device 34 connected to the V bus 28 through V bus transfer module 36A. Other equipments, such as a workstation, are connectable with the V bus 28 through transfer module 36A by using a suitable interface and a SCSI cable.

[0020] With reference to drawing 4, the composition of V bus transfer module 36 is explained still in detail. The transfer module 36 shown in drawing 4 is equipped with the packet buffer 38, the V bus interface 40, and the DMA transfer unit 42. The transfer module 36 is designed using the "VHSIC" hardware description language (VHDL: VHSIC Hardware Description Language), makes it possible to transmit the packet of image data at a comparatively high transfer rate along V bus, and is constituted programmable. Especially, a packet buffer 38 is programmable to be able to change a segment or a packet according to the usable bandwidth of the V bus 28. For example, a packet buffer is programmed to be able to treat the packet to 64 bytes. Suitably, it is reduced when V bus is comparatively crowded, and a packet size is expanded when V bus is comparatively vacant.

[0021] Adjustment of a packet size is performed by the V bus interface 40 (drawing 4) and the system controller (drawing 6). Essentially, the V bus interface 40 consists of two or more logical elements, and contains an address counter, a decoder, and a state machine (state machine) and others. V bus interface can constitute a transfer module intelligent to a desired grade. An interface 40 communicates with a system controller 44, and is used for adjustment of the packet size of a packet buffer 38 by the result which asked for the desirable packet size serially and asked for it according to the state of a bus. That is, a controller 44 can emit instructions to an interface 40 in consideration of the information about the state of the V bus 28, and an interface 40 can adjust a packet size according to this. The back gives further explanation about a transfer module more nearly anew.

[0022] Furthermore, a picture transfer is performed by the DMA transfer unit 42 which transmits a packet using a well-known DMA transfer method conventionally. That is, the starting address and ending address of a packet are used by the transfer unit 42 in order to transmit. If a transfer is completed, an interface 40 will return a signal to a system controller 44, and will acquire the further information, such as a desirable packet size and the address destination.

[0023] It is shown in drawing 2 and drawing 3 that three I / O units are functionally connected to the V bus 28. They are the I / O unit 48, i.e., a FAX module, a scanner (IIT) 18, and a printer (IOT) 20. However, to say nothing of the equipment connected to V bus not being restricted to these, various equipments can connect with the V bus 28 through an expansion slot 50. With reference to drawing 5, it explains in more detail about the composition of the FAX module 48 connected to the V bus 28 through transfer module 36B. With suitable composition, facsimile apparatus (FAX) 51 Compression/extension section 52 which performs the data compression and extension dealing with Xerox (Xerox adaptive), The scaler section 54 which carries out the scaling (namely, amount-of-data calculation) of the compressed image data, The CCITT section 56 which performs the conversion and its inverse transformation to the CCITT format of the compressed image data, Conventionally, through a well-known communication line, it transmits to a telephone or the modem 58 (made in [U.S.] Rockwell Corporation (Rockwell Corporation) is suitable) conversely received from a telephone is included for the data of a CCITT format.

[0024] In drawing 5, sections 52, 54, and 56 and the modem 58 are connected to transfer module 36B by the control line 60. Thereby, even if there is

no processor, the transfer from the FAX module 48 and the transfer to the FAX module 48 are attained. Transfer module 36B can function as the master or slave of a FAX module, to FAX, the image data for transmission is supplied or the transfer module receives the facsimile data inputted so that clearly. Transfer module 36B is the same method as the method of the reaction to other I / O units, and reacts to the FAX module 48. For example, when transmitting a FAX job, whenever transfer module 36B supplies a packet group to a section 52 and supplies one packet by the DMA transfer unit 42, the transfer module transmits an interrupt signal to a system controller 44, and requires the following packet. In one mode, two packets are held in a packet buffer 38, and can also carry out "ping-pong processing (ping-ponging)" of the data between these two packets. Even when according to this mode a controller 44 receives an interrupt signal and it cannot respond to transfer module 36B immediately, image data is not lost in transfer module 36B.

[0025] If it explains with reference to drawing 3 again, IIT18 and IOT20 are functionally connected to the V bus 28 respectively through the transfer modules 36C and 36D. Moreover, IIT118 and IOT20 are connected to the compression module 62 and the extension module 64, respectively. A compression module and an extension module are suitably constituted as a single module which adopted the compression device dealing with Xerox. The compression device dealing with Xerox is used by Xerox Corporation until now for the data compression and extension processing in the DocuTech (registered trademark) printing system of the company. In fact, at least some functions of the transfer module 36 are offered by the three-channel DVMA device. This device offers the function of the local competition mediation (Arbitration) in compression / extension module.

[0026] Moreover, with reference to drawing 3, a scanner 18 is connected to ANOTETO / merge (****) module 66 including the image-processing section 22. Suitably, the image-processing section 22 contains 1 or two or more special purpose processors which programmed various functions needed. These functions have an image enhancement, threshold-izing / screen-izing (SURESSHORUDINGU/screening : Thresholding/Screening), rotation, resolution conversion, TRC adjustment, etc. a group -- these functions are alternatively started by the image-processing control register These registers are adjusted by the system controller 44. Suitably, connection composition of each [these] function is carried out as a "pipeline", on the other hand, from an edge, it is inputted and, as for image data, the pipeline's image data by which the image processing was carried out is outputted from a pipeline's another side edge. In order to raise a throughput, transfer module 36E is connected to the one side edge of the image-processing section 22, and transfer module 36C is connected to the another side edge of the image-processing section 22. By connecting the transfer modules 36C and 36E in this way, the concurrency of processing can be efficiently performed now by return (loop back).

[0027] Moreover, in drawing 3, competition mediation of various bus masters in VCM16 is performed by the V bus arbiter 70 arranged at V bus arbiter / bus Gateway section 71. A bus arbiter 70 determines which bus master (for example, a FAX module, a scanner, a printer, a SCSI hard drive, EPC memory, the network service section) can access the V bus 28 as the given time. An arbiter 70 consists of two main sections and the one control section. The 1st section, i.e., a "high path (Hi-Pass)" section, receives the bus request and current priority selection which are inputted, and it issues permission to the high request of a priority most in the request of a processor limited. Current priority selection is the output of the 2nd section of an arbiter 70, and calls this section "priority selection" section. The rotation and the selection algorithm of a priority are used for this section. The sequence that the request of a processor limited is processed is determined by the output of the logic for priority selection. The input to "priority selection" is a register holding initial arrangement of the device group in a priority chain (chain). It is in charge of processing of a request group, and this logic makes a device group go up and down in a priority chain, and chooses the position of the next request of a device. The synchronous control of the control logic (section) is carried out by carrying out the monitoring of the signal concerning operation of a request/permission in the task of a high path section and a priority selection section. Thereby, occurrence of a race state can be prevented.

[0028] With reference to drawing 6, the network services module 14 is explained in more detail. If it is this contractor, the architecture of the network services module 14 is similar to the architecture of well-known "PC clone (compatible opporrunity of the personal computer made from IBM)" so that it

may understand. Furthermore, in the suitable mode, the controller 44 (the form of the SPARC processor which Sun Microsystems, Inc. of the U.S. (SunMicrosystems, Inc.) manufactures suitably is taken) is connected to the standard S bus 72 in detail. In the example of drawing 6 , the host memory 74 which takes the form of DRAM suitably, and the SCSI disk drive 76 are functionally connected to the S bus 72. Although not shown in drawing 6 , storage or an I/O device is also connectable with the S bus 72 using a suitable interface chip. Moreover, as shown in drawing 6 , the S bus 72 is connected to the network 78 through the suitable network interface (I/F) 80. In one example, network I/F80 has all hardware and software required to connect with the hardware / software parts of a controller 44, and the hardware / software parts of a network 78. For example, in order to carry out the interface of various protocols between the network services module 14 and a network 78, Netware (registered trademark) of the novel company (Novell Corp.) in the U.S. can be used for network I/F80. Of course, other software other than this may be used for I/F80.

[0029] In a certain example, a network 78 contains a client like the workstation 82 equipped with the emitter (namely, driver) 84. For example, a user generates the job containing two or more electronic pages and processing-instruction groups. Then, the job is changed into expression of a Page Description Language like PostScript (registered trademark) by the emitter 84. And it is transmitted towards a controller 44 and a job is interpreted by deconstructivism POZA (interpreter of a Page Description Language) which is offered by Adobe (Adobe Corporation) of the U.S. by the controller 44.

[0030] If drawing 3 is referred to again, the network services module 14 will be connected to VCM16 through bus Gateway 88 of V bus arbiter / bus Gateway section 71. For example, bus Gateway 88 contains the field programmable gate array offered by U.S. ZAIRINKUSU (XILINX Corporation). A bus Gateway device offers an interface for a host's S bus and V bus of VCM16. Bus Gateway offers V bus address conversion function for accessing the address space of the real address range of V bus. The DMA Channel for the data transfer from memory to memory is also prepared in bus Gateway. Bus Gateway decodes the virtual address from bus masters, such as the transfer module 36, so that access without the joint between S bus and V bus (it is seamless) may be enabled and an identifier can be acquired from a corresponding slave unit. If it is this contractor, it will be able to understand easily that many components of the printing system 10 can mount in the form of one ASIC.

[0031] With reference to drawing 3 , and 4 and 6 , the DMA transfer of each transfer module 36 is explained further. For example, the picture group of a job is stored in the host memory 74 as a series of blocks. Suitably, each block contains two or more packets, respectively. In operation of this mechanism, the starting address and the size of a block of a block are given from a controller 44 to one of the transfer modules 36. then -- the block -- the transfer module 36 -- a packet transfer -- performing -- a counter -- an increment -- or a decrement is carried out This procedure is repeated for every packet of the block until it detects that the interface 40 transmitted the last packet with reference to the counter. Typically, some blocks are transmitted per packet like **** about each memorized picture.

[0032] The queue of the job group 200 which is waiting to be processed by the printer 20 of drawing 2 is shown in drawing 7 . Like the conventional print queue, the job under present printing is displayed on a window 202, and it is used for a button 204 scrolling the list of jobs up and down. In the multirole printing system of the type explained as a background of invention, more queues than 1 are suitably used for various services to offer. For example, the job which is waiting for scanning is put in by the scanning queue, and the job which is waiting for facsimile transmission is put in by the FAX queue. The printing queue (it is also called a mark queue) shown in drawing 7 is one in two or more queues used by the printing system 10. Moreover, a job is a method equivalent to the method shown in U.S. Pat. No. 5,206,735, and is inserted in a queue. Moreover, a queue can also be formed in the network services module 14 and other various parts which were shown in VCM16 shown in drawing 3 , or drawing 6 .

[0033] Also in which multirole products (below, it may be called MF engine), such as the printing system 10 mentioned above, two or more users may sometimes do an access demand potentially simultaneously at 1 or two or more subsystems. This access competition may take place in various fields of MF engine. Access competition takes place as competition to two or more kinds of resources, such as competition to resources with the single EPC memory 24 of drawing 3 etc. or the EPC memory 24, and IIT (scanner). If it will be in a race condition, the printing system 10 must correspond [that

various users are satisfied and] to it by the controlled expectable method.

[0034] In a suitable example, following at least two competition methods of administration are taken into consideration.

[0035] 1. In the FIFO (FIFO) job management this gentleman method, competition is treated by the method of "processing first what entered first." The job inputted before other jobs uses required resources first. Other jobs which require the same service are arranged in order of each time of arrival, and obtain an opportunity to use the service finally.

[0036] 2. Access to the resources in an option is managed according to the algorithm which the key operator or the system administrator (it abbreviates to "KO/SA" (Key Operator/System Administrator)) specified (refer to drawing 11 explained later). According to this algorithm, KO/SA is the type of a job, and an immediate WOKU rise (the job specified till the place of equipment according to the need (immediate walkup need) for walking, an interruption history, and other related factors can be treated.). The algorithm is constituted so that job competition may be managed according to a request of a typical printing system user. Since the algorithm can be adjusted flexibly (program), it can also offer a FIFO function. In other words, FIFO can be called one in the capacity of this algorithm.

[0037] At least five job types are treated by KO/SA in the printing system 10.

[0038] 1. Copy printing job (namely, WOKU rise job) : job of WOKU rise user (user who comes till the place of equipment and inputs a job and directions) who needs marking resources corresponding to IIT and this. Here, marking or mark processing is a concept including "printing" processing, and expresses the comprehensive concept independent of the concrete method of the processing (printing) to the kind of target medium, or its media (paper etc.).

[0039] 2. Automatic report printing : reports printed automatically, such as FAX report and report of error log, equipment, or copy use. The report specified by KO/SA is printed from memory resources, and needs use of a marking (printing) engine.

[0040] 3. Network printing : going into this job category is as follows.

[0041] a) The job which arrives from the source on a network through the network services module 14. This job needs marking resources.

[0042] b) The software mail box job of the network services module 14 (below, referred to as "ESS") started by a WOKU rise user or the remote user. In addition, a mail box is the system which assigned each output bottle (delivery tray) with which a printing system is equipped as each user's printing result, or an exclusive output place of Reception FAX, respectively.

[0043] c) The job of all others resulting from ESS or a network.

[0044] 4. FAX mail box : the following are contained in this job category.

[0045] a) Reception FAX accumulated in the system in order to carry out a printout, when a user requires (reservation).

[0046] b) The local report of system usage, a FAX log, etc.

[0047] c) The job of others resulting from the EPC memory 24 (drawing 3) or the printing system 10 (referred to as "MFSYS").

[0048] 5. FAX printing : receiving FAX job which should be immediately carried out printout. Such a job is memorized in the EPC memory 24, and is printed immediately.

[0049] Probably, the following terms will be useful in order to understand explanation of this operation form better.

[0050] Permission user: The user by whom the access privilege is restricted rather than KO/SA although permission level higher than a general user has been obtained. This is the permission level prepared for the VIP user.

[0051] Interruption level: As for resources (resource), resources may receive interruption to the present active job. This is called the 1st level interruption or interruption level 1. When the job of an interruption state itself is interrupted, this is the 2nd level interruption 2, i.e., an interruption level.

[0052] Job type priority: A priority is given according to a job type or a user type. The example of priority grant based on a job type is explained later.

[0053] Resources (resource): All mechanical element [that are needed for processing a job], electronic element, and software element.

[0054] Marking (printing) resources: Resources used in order to print a job to the medium of the given kind.

[0055] Memory resources: Various kinds of read/write memory used by the printing system 10. For example, the memory 24 and 34 of drawing 3, memory 74 and 76 of drawing 6, etc. That is, both high speed storage, such as semiconductor memory, and large capacity storage, such as a hard disk drive unit, are included.

[0056] A marked job: The job which printing already finished. This term does not suggest the specific method which uses in a meaning more comprehensive than " a printed job", and is used for writing in a medium.

[0057] following printing candidate: --/which is a job in the head of a job queue and was stabilized -- it is the technical term which shows the job "is printed next" from a queue in a normal state

[0058] With this operation form, competition management is optimized using the table shown in drawing 11 containing the set point of a competition priority-processing algorithm.

[0059] With regards to explanation of the following [table / which was shown in drawing 11], when a certain situation produces KO/SA by this table, a system can set up how it should operate. This table is used in order to set up how which type of job exists in a system, and the produced competition situation should be managed. If it is this contractor, the header entry of the above-mentioned table will also be able to understand that it can change according to the function of system architecture, for example, a WOKU rise job like ESS_MB (mail box : mailbox) can be seen as a network printing job like other equivalent tables which come out below.

[0060] In drawing 11, the train (length) of a table enumerates the user jobs which may be produced in a printer (competition may take place). The line (width) of a table enumerates the types of competition which may take place. Behavior of equipment in case a specific competition situation has the job type concerned is specified in the cell which a train and a line intersect.

[0061] If above-mentioned drawing 11 is referred to, he will be able to understand the explanation about the following competition management technique well.

[0062] Permission user priority: By this setup, it is a permission user (referred to as AU). The abbreviation for Authorized User can interrupt other jobs on IOT. AU can interrupt by giving priority to the job of all types. In the case as the job interrupted is already over the interruption upper limit (for example, when the printing job by which the interruption upper limit was set as 4 times is already interrupted by other job groups 4 times and the present marking resources are used etc.) this upper limit -- after -- even explaining -- AU can interrupt the job

[0063] The job (namely, job generated by AU) to which the tag of AU was attached is a priority 1 (the highest priority). Here, if the set point of a table is 'Y', the AU job can interrupt other jobs with a priority always lower than itself. On the other hand, if the set point of a table is 'N', the job will follow the contents of an entry of the 4th line (drawing 11) about the job type of the job under present printing. That is, in 'N', the priority of AU job is not accepted, but is treated like [AU job] a normal job, and the interruption propriety of the AU job is determined by whether the job under present processing accepts interruption of the job of a high priority from itself (this is decided by the 4th-line setup of a table). Here, though interruption of AU job is not accepted, since the highest priority is given to AU job, AU job will be located before other general jobs (AU except a job) in a queue.

[0064] The number of times of the maximum interruption permission about a job type (below, it may abbreviate to "Max" or "MAX"): This specifies to how many times it can interrupt to a job. If the number of times of interruption permission set up about the job is reached, it cannot interrupt any more to the job, and the job will be allowed to process to the last using the resources then used. Supposing there is an exception over this rule, it is the case of above-mentioned AU priority. The number of times by which the job was interrupted is total of the number of times which other job groups interrupted

to the job. For example, supposing it interrupted when a copy job changed with one FAX job and four different printing jobs, and the number of times of the maximum interruption permission of the copy job was set as 4 times at this time, it means exceeding the number of times of the maximum interruption permission.

[0065] "Next it processes" (N) (interruption button *********** / disable).: When the button of the hardware for interruption of a printer 12 (drawing 2) is *********** (usable), as for the job by which the tagging was carried out as an "interruption button job" ["interrupting immediately" (Y) or] If the 3rd line of the table shown in drawing 11 about a certain job type is set to 'Y', the job type can disregard the 4th-line setup of 'N' of drawing 11 , and can interrupt other jobs with a priority lower than itself.

[0066] or it accepts job type interruption of a priority higher than itself -- : -- the job type with which this is set to 'Y' may be interrupted from the job type concerned according to the job type of a high priority, or a resources excess state (see the table of following drawing 12)

[0067] Job type priority specification: This specifies the priority of the job based on a job type. The basic types of a job are enumerated in the table shown in drawing 11 . These comprehensive job category, and various individual job types are included, therefore all individual concrete job types are not shown in a table.

[0068] Operation: A job is inserted in a queue as one example according to the input to a printing system. When a priority is higher than the type of job with the another type of a certain job, the former job is inserted before the latter job in a queue. When the priority assigned to two jobs is the same, they are inserted in a queue according to the time stump when going into a queue (that is, FIFO management is carried out). The job is passed by other jobs which can use a marking engine, when the mark processing of the job cannot be carried out, since it is the unsuitable medium which the marking engine has in the job being inserted in a queue or the job group has accumulated into the queue in the reason for analogous in addition to this. Once a job comes to the head of a queue, when the job has a priority higher than the job under present printing and a possible (***********) setup of interruption" of the job of a priority higher than "is carried out, the job (job of the head of a queue) with the higher priority interrupts the job under present printing.

[0069] The timer of the job in a queue: It can prevent being dammed up in a job queue by the job group in which a job has a priority higher than itself by this. A priority is raised by the technique of showing below the job which continued being during the predetermined maximum allocation time in the queue. However, the job which was able to raise the priority follows the rule set as the table shown in drawing 11 . When the time limit (the maximum allocation time) to which two or more jobs were assigned is reached, FIFO processing of them is carried out at the head of a queue.

[0070] In addition, the set point of each cell of the table of drawing 11 is an example to the last, and KO/SA can set up the desired set point according to the situation of a system configuration and others.

[0071] As shown in the table shown in drawing 12 , a setup is made by KO/SA to a resources excess state.

[0072] The state or parameter shown in the table of drawing 12 is produced when the storage capacity of the memory used for FAX printing exceeds a predetermined threshold. FAX memory resources (the memory and the disk unit for receiving FAX data accumulation) are full at the time of reception of a FAX job, if IOT is printing other jobs, interruption will be performed to the job under present printing by this, and the received FAX job will be printed. According to this parameter, the received FAX job is immediately moved to IOT from a queue after all, and a marking engine will be interrupted in order to open FAX memory resources.

[0073] The composition (configuration) template group is prepared for saving of the time for a customer's system configuration, and selection of KO/SA is presented. If a template is chosen by KO/SA, it sets a competition table (for example, drawing 11) automatically to the established state which supports a customer's needs the optimal. For example, the system is preparing six templates for a user's selection. The definition about the system configuration even with a FAX center or various systems based on printings from the system of FIFO composition is offered by these templates. A default setup at the time of manufacture is included as one of six templates. Label attachment of this template is carried out with the default setting

template or the "FIFO" template. The template for the queue management which does not include job priority interruption is also prepared.

[0074] The example of six templates is given to below.

[0075] 1) The fundamental FIFO method which does not perform interruption based on a priority (default template) : it is the table of fundamental FIFO method management on which all setup of automatic interruption is forbidden. An interruption button is usable (**********) (the 3rd line of the table of drawing 11 is set as 'Y'). All the jobs set up by this template are treated as the same priority, and marking processing is performed by the FIFO (FIFO) method except for the marking processing for error processing.

[0076] 2) The copy priority method based on a priority (however, interruption based on a priority is not performed) : it is the template of the priority base which gives priority to a copy and WOKU rise operation of a scan and others, and use of IOT job interruption management is not accepted by this template, either.

[0077] 3) The FAX priority method based on a priority (however, interruption based on a priority is not performed) : it is the template of the priority base which gives priority to a FAX receiving job. After a FAX receiving job, a WOKU rise job and a printing job are performed. In this template, interruption control is not suitably performed in job management.

[0078] 4) The network printing priority method based on a priority (however, interruption based on a priority is not performed) : it is the template of the priority base which gives priority to a network printing job. After a network printing job, a FAX direct printing job is performed for a WOKU rise job a line crack and after that. In this template, interruption control is not suitably performed in job management.

[0079] 5) The copy / scanning priority method of the priority base which can be interrupted based on a job type : it is the template over which priority is given to the WOKU rise job of a copy/scan, and others based on a priority, and an interruption setup is possible.

[0080] 6) The printing priority method of the priority base which can be interrupted based on a job type : it is the template over which priority is given to a printing job based on a priority, and an interruption setup is possible.

[0081] Although the idea into which other interruption jobs are wedged to an interruption job was shown in the above-mentioned conventional technology with the idea of printing a certain type of job (for example, copy job) before a job (for example, printing job) another type, if a system tends to attach priority to many jobs job type [many], a problem will arise. The queue management scheme based on the priority for determining the following job which acquires the resources of a system with reference to drawing 8 is explained. In the example shown in drawing 8, the priority of a job is determined based on the service which generated the job concerned. Suitably, SA/KO (a system administrator or key operator) sets up the relative priority of each service (put into a job by the queue from this service).

[0082] The job is inserted in the job queue of corresponding resources, when saying roughly and a certain job needs system resources, such as a scanner and a printer. When the resources can begin to process a job came, the resources acquire the job of the highest priority from their own queue.

[0083] The queue management scheme based on a priority is useful in especially the field of job interruption. The table shown in drawing 8 shows the case where the job of a certain service can interrupt the job of another service (also refer to drawing 11). The relation shown in drawing 8 is called "interruption possibility." KO/SA creates the interruption possibility matrix of drawing 8 . This matrix shows the relation of the interruption possibility between the jobs of two or more service types. The interruption possibility scheme of this operation gestalt contains the following concepts.

[0084] 1) SA/KO specifies the relative priority of each job (refer to above-mentioned drawing 11) generated by service (for example, the priority of the "remote file" of drawing 8 is relatively high.). It is because it can interrupt to other six job types.

[0085] 2) SA/KO specifies the interruption possibility matrix about these jobs (for example, a copy job can interrupt a printing job).

[0086] 3) If a job is generated in the printing system 10 (drawing 2), based on a service type, a priority will be given to the job.

[0087] 4) Each system resource has the job queue for itself (for example, the job in each queue is put in order according to the job priority).

[0088] 5) If processing of a job of a system resource is attained, the resources will process the job of the highest [priority / in its own queue].

[0089] 6) When a certain resources are processing the job and the new job is demanding the resources, it processes as follows.

[0090] (a) (the priority of a new job is higher than the priority of the present job) And (the present job is not an interruption job) when it investigates [whether ** is filled and] whether (b) and (service of a new job can interrupt service of the present job) will be further satisfied if it judges and (a) is filled and (b) is satisfied (a new job interrupts the present job).
When (b) is not satisfied (a new job is added to the job queue of the resources),
When (a) is not satisfied (a new job is added to the job queue of the resources).

[0091] When there is a job interrupted in the resources, the resources resume processing of the interrupted job.

[0092] With reference to drawing 8 , supplementary information is again carried out about the table of drawing 8 . First, the matrix of drawing 8 shows possibility (interruption possibility) that the job of a certain service will be interrupted by the job of another service. The judgment of interruption possibility is generated, while the job is using the system resource and the job of another higher priority is demanding the resource. Next, in the table, "Yes" shows that the job under present processing of each service (train) is interrupted by the new job (line) of each service with a priority higher than the job. Especially in case turn attachment of the matrix of drawing 8 is carried out into a queue at a job, it is useful. Within the queue, a job type relative priority is directly decided according to the matrix. For example, in the example of drawing 8 , a "remote file" has the highest priority and a priority higher than a copy job is given.

[0093] Next, with reference to drawing 9 and drawing 10 , another example of priority attachment to the job in a queue is explained. Three concepts are used in this example.

[0094] The 1st concept is an already explained concept and is the input origin (service of the source, i.e., a job generator.) of the job about the priority of a job. For example, it is the concept of deciding based on scanner application, ESS or the network source, marking service, etc. About each service / application / input origin, KO/SA assigns the value of a priority (for example, values from zero to 50). With an example of this 1st concept, a system has three inputs (a scanner, a network, FAX), the case where a priority higher than a FAX job and a network job is set up to a scanner job -- being alike -- KO/SA -- for example, a value is given to these inputs as follows

[0095] The 2nd concept of "FAX:10, network:10, and a scanner 30" raises the priority of the job based on the method which generated the reason for having generated the job, or the job (it is made higher than the priority given by the 1st concept of the above). In a mode with this concept, the printing system 10 gives the priority of 2 level to interruption. That is, they are two level, "interruption 1" and "interruption 2." For example, the scan or copy job instructed "To print immediately" is treated as a job of "interruption 1", and the network job with an interrupt priority is treated as a job of "interruption 2." In the approach which gives high priority from a network to a job, the network job will be specified to be the job of "interruption 1." In one example, a high value (for example, 50) is given relatively [job / of "interruption 1"], and a low value (for example, 20) is given relatively / job / of "interruption 2"]. According to the 1st concept and the 2nd concept, the value of 50, 30, 20, and 10 is given to an interruption scan job, a scanning job, an interruption-network job, and a network job, respectively.

[0096] The increment value beforehand set that the time interval defined beforehand passes over the 3rd concept to the priority value of each job in a queue is applied. Moreover, by the 3rd concept, whenever a job is interrupted by another job, only a predetermined increment value can also increment the value of the job, so that it may turn out that above-mentioned drawing 11 is referred to. In the 3rd concept, a user specifies the increment (for example, 0-50) and time interval (for example, 1 - 30 minutes) of a priority by two values, i.e., time. When the increment of a priority is unnecessary, KO/SA should just set the increment of the priority by time as 0. In the example of this 3rd concept, the priority value of a job does not exceed the upper

limit (for example, 100) defined beforehand.

[0097] The example for explaining the three above-mentioned concepts is shown in drawing 9 and 10. Finally in this example, Job C will reach level on which it does not succeed in interruption even by the job with a priority higher than it by priority increment processing. Within a mark queue, a job is arranged in order of a priority and the job of the highest priority comes to the head of a queue so that clearly from drawing 9 and drawing 10 . Moreover, after a job goes into a queue, whenever it carries out predetermined-time (drawing 5 minutes) progress, the priority of the job is raised the predetermined increment value (drawing 10) every.

[0098] If it is this contractor, many features of the operation form explained above will be able to understand.

[0099] First, according to the above-mentioned operation form, according to a job priority or a user priority, the queue management which can be changed is realizable. In one example, a value (priority value) is given to the job based on the user who generated the service which generated the job first, or the job. By this method, a job is inserted in a queue according to the priority, i.e., the permission level of a job generator, given beforehand. Interruption of a remote shell can be made to start by taking the permission level of a job generator into consideration. That is, if the user of RIMOTO or service of RIMOTO has permission level high enough, it can be required as printing one's job immediately from the printer of RIMOTO.

[0100] Moreover, according to the above-mentioned operation gestalt, the relative priority over other job type job types can increase the efficiency of queue management by using the job priority table (namely, matrix) set up according to service of the generator of a job. The matrix can express the consideration about the interruption possibility between service kinds. For example, a matrix can be used [whether the 1st job type can interrupt processing of the 2nd job type and] for the judgment of **.

[0101] Moreover, according to the above-mentioned operation gestalt, a bird clapper can be prevented as the job originated in service of the generator and stopped within the queue. In suitable approach, a value (priority value) is given to each job in a queue, respectively. If a job is fixed within a queue, the value of the job will be raised to a grade by which it sets beforehand and the job is processed within a ******** period irrespective of the priority of the beginning of the job. Or a priority value can also be raised whenever a job is interrupted by other jobs.

[0102] Finally, when room with the job which entered cannot be required and the present usable room cannot fill the demand, the system of the above-mentioned operation form can also be constituted so that the job under present processing may be interrupted automatically. Out of memory, this composition is especially effective, when a part of FAX job resulting from 1 or two or more jobs which are processed now which enters more is lost.

[0103] [Additional remark 1] Can accept the job of two or more types and the inputted job is temporarily held at a queue. The list with which it is the multirole printing system which takes out a job in order and processes it from this queue, and the precedence relation during the type of a job is set up, The system which has a job receptionist means to discriminate the type from the inputted job and to insert in the aforementioned queue, and the processing control means which process each job in a queue in order according to the precedence relation set as the aforementioned list.

[0104] [Additional remark 2] The type of the aforementioned job is the system of the additional remark 1 publication characterized by what service of the generator of a job opts for.

[0105] [Additional remark 3] The precedence relation of the job type set as the aforementioned list is the system of the additional remark 2 publication characterized by what it opts for based on the table which set up the relative priority relation of each service compartment of the generator of a job.

[0106] [Additional remark 4] Can accept the job of two or more types and the inputted job is temporarily held at a queue. It is the control method of the job-processing sequence in the multirole printing system which takes out a job in order and processes it from this queue. The method characterized by inserting in a queue after setting up the precedence relation of the processing sequence during each type of a job and discriminating the type of a job to the inputted job concerned, and processing from the job of priority high type most among the job groups in a queue.
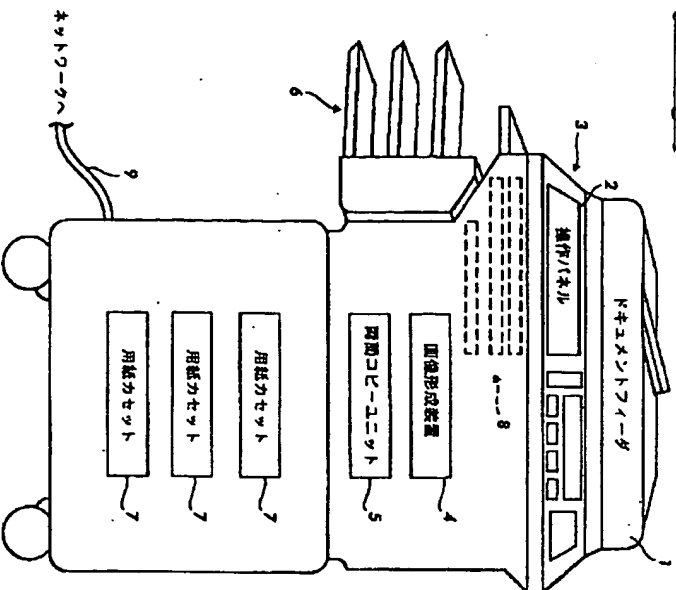
[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

[Drawing 2]

[Drawing 4]

[Drawing 6]

[Drawing 8]

ネットワーク
サービス
モジュール ～14

ピクチャ
コントロールモジュール
(PCM) ～16

スキャナ ～18
プリンタ ～20

10
12

バッファ
インタフェース

V バス
インタフェース ～40
DMA 転送ユニット

パケット
バッファ ～38
42

36

ワーク
ステーション ～82
エミッタ ～84

ネットワーク
78

ネットワーク
I/F ～80

ディスク
Disk ～76
I/F

コントローラ ～44

メモリ ～74

Sバス
72

VCM ～16

14

【Drawing 3】

現在のジョブのサービス
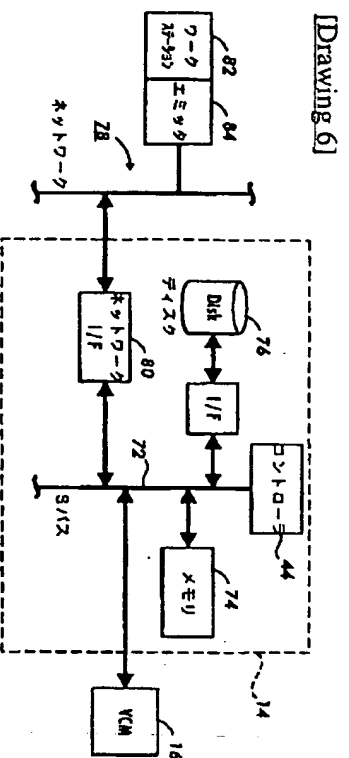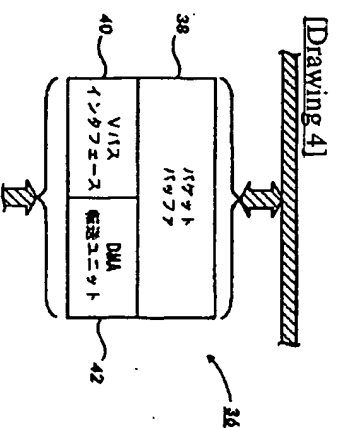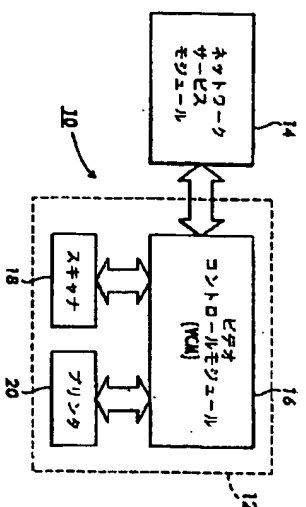
新たなジョブのサービス	コピー	印刷	FAX受信	FAX送信	ローカルファイル	リモートファイル
コピー	Yes	Yes	Yes		Yes	Yes
印刷		Yes	Yes		Yes	Yes
FAX受信		Yes	Yes		Yes	Yes
FAX送信				Yes	Yes	Yes
ローカルファイル		Yes		Yes	Yes	Yes
リモートファイル						Yes

- SCSI ハードドライブ 34
- FAX 51
- EPC メモリ 24
- UI 134
- 32
- 48
- 30
- Vバス転送モジュール 36A
- Vバス転送モジュール 36B
- DRAM コントローラ 33
- I/F 212
- V Bus 28
- Vバス転送モジュール 36E
- Vバス転送モジュール 36C
- Vバス転送モジュール 36D
- 拡張スロット 50
- 圧縮モジュール 62
- 伸張モジュール 64
- 16
- アノテート／マージ 66
- 画像処理部 22
- IOTへ
- IITへ

スキャン可能　　　　　　　　印刷ジョブ１１６印刷中

ブ
ージャ

プリンタ
キュー

ジョブ
ファイル

印刷ジョブ116		ソート：なし	閉じる

ジョブ	値	用紙	出力	
準ジョブ　116 フォルト オーマット済	456 04/09/90 11:17:32	8.5 x 14.0 標準	白	ステープル留め
準ジョブ　117 217 オーマット中	23 04/09/90 11:17:32	8.5 x 11.0 標準 8.5 x 11.0 標準	ブルー 白	スタッカ
準ジョブ　118 5 オーマット済	56 04/09/90 11:28:30	8.5 x 14.0　穴あき 8.5 x 11.0　穴あき	白 白	製本
準ジョブ　119 フォルト オーマット済	212 04/09/90 11:32:16	9.0 x 11.0 タブ付き	白	スタッカ
準ジョブ　120 フォルト ォーマット中	7 04/09/90 11:35:17	9.0 x 11.0 タブ付き 8.5 x 11.0 標準 8.5 x 11.0 標準	白 イエロー ピンク	製本

プリンタ
オプション

スキャン
停止

印刷
停止

[Drawing 1]

統合優先処理アルゴリズム設定（IOT）

#			ウォークアップコピージョブ／プロセッサジョブ	ESS MB印刷／FAX MB印刷／ユーザ書込による／レポート／ESS／NFSYS（おし印刷）	グループ印刷／FAXレポート印刷	自動レポート及びESS／NFSYS	PS FAX出力（ホストスクリプトデコンポーザ2時間以降）
1	許可ユーザ（AU）優先 全てのAUジョブの優先度は1 ・‘Y’ならば、AUジョブは そのタイプのIOTジョブに割込み可能 ・‘N’ならば、AUジョブは次に印刷される ジョブとしてキューの先頭に挿入される （注：‘Y’はその列についてのみ 第4行の設定を無視することを意味し、 ‘N’は第4行の設定に従うことを意味する）	Y／N	N	N	N	N	NA
2	最大割込解除回数	Y／N 無制限	5	5	5	5	NA
3	割込ボタン・イネーブル／ディスエーブル ・‘Y’にセットされ、かつ割込ボタンが 選択された場合、ジョブは優先度2になり、 そのジョブより低い優先度のジョブに割り込む ・‘N’にセットされれば割込ボタンが 選択された場合、 ウォークアップジョブが優先度2になる （注：‘Y’はその列についてのみ 第4行の設定を無視することを意味し、 ‘N’は第4行の設定に従うことを意味する）	Y／N	Y	Y	Y	Y	NA
4	自分より高優先度のジョブタイプの割込を 許すか？	Y／N	N	N	N	N	NA
5	ジョブがキュー内に存在できる最大時間	0.5-24.0hr	1	↑	↑	↑	↑